

WHAT IS CLAIMED IS:

1. A microfluidic device comprising:
 - a first chamber adapted to retain one or more first components for a desired reaction;
 - a second chamber;
 - at least one second component retained in the second chamber, the at least one second component comprising one or more of an enzyme, a catalyst, an initiator, a promoter, and a cofactor, for the desired reaction; and
 - an openable communication between the first and second chambers.
2. The microfluidic device of claim 1, further including at least one first component retained in the first chamber.
3. The microfluidic device of claim 1, wherein the second component is a catalyst.
4. The microfluidic device of claim 3, wherein the catalyst contains magnesium.
5. The microfluidic device of claim 3, wherein the catalyst is an aqueous solution containing Mg^{2+} ions.
6. The microfluidic device of claim 1, wherein the second component is an initiator.
7. The microfluidic device of claim 1, wherein the second component is a promoter.

8. The microfluidic device of claim 1, wherein the second component is a cofactor.
9. The microfluidic device of claim 1, further comprising reactants for a nucleic acid sequencing or amplification reaction, the reactants being disposed in the first chamber.
10. The microfluidic device of claim 1, wherein the openable fluid communication comprises a valve.
11. The microfluidic device of claim 10, wherein the valve comprises a Zbig valve.
12. The microfluidic device of claim 10, wherein the valve comprises an adhesive material.
13. The microfluidic device of claim 10, wherein the valve comprises a recloseable valve.
14. The microfluidic device of claim 1, further comprising:
a third chamber; and
an openable fluid communication between the third chamber and at least one of the first and second chambers.

15. A method, comprising:

providing a microfluidic device comprising:

a first chamber;

at least one first component retained in the first chamber, the at least one first component comprising one or more reactant or reagent or component for the desired reaction; and

a second chamber;

at least one second component retained in the second chamber, the at least one second component comprising one or more of a catalyst, an initiator, a promoter, and a cofactor for a desired reaction; and

an openable communication between the first and second chambers;

opening the openable fluid communication between the first and second chambers;

at least one of combining and mixing the at least one first component with the at least one second component.

16. The method of claim 15, further comprising the step of heating the microfluidic device;

17. The method of claim 15, further comprising the step of opening the openable fluid communication between the first and second chambers.

18. The method of claim 15, wherein one or more of the at least one first component and the at least one second component comprise double-stranded DNA or double-stranded DNA fragments.

19. The method of claim 16, wherein heating the microfluidic device comprises heating of at least one of the first and second chambers to a temperature sufficient to denature the double-stranded DNA or the double-stranded DNA fragments.

20. The method of claim 16, further comprising:
cooling the microfluidic device to a temperature sufficient to allow single-stranded DNA or single-stranded DNA fragments to anneal to other single-stranded DNA or single-stranded DNA fragments.

21. The method of claim 20, wherein cooling the microfluidic device causes the mixture to undergo a nucleic acid, amplification, ligation, endonuclease, or sequencing reaction.

22. The method of claim 15, wherein the method further includes injecting a sample into the first chamber.

23. The method of claim 15, wherein at least one of the first chamber and the second chamber is at least partially pre-filled with a nucleic acid sequence amplification reaction component.

24. The method of claim 15, wherein at least one of the first chamber and the second chamber is pre-filled with a nucleic acid sequence amplification reaction component.
25. The method of claim 15, wherein at least one of the first chamber and the second chamber is at least partially pre-filled with a nucleic acid sequence detection reaction component.
26. The method of claim 15, wherein at least one of the first chamber and the second chamber is pre-filled with a nucleic acid sequence detection reaction component.
27. The method of claim 15, wherein at least one of the first chamber and the second chamber is at least partially pre-filled with a nucleic acid sequence restriction reactant component.
28. The method of claim 15, wherein at least one of the first chamber and the second chamber is pre-filled with a nucleic acid sequence restriction reaction component.
29. The method of claim 15, wherein causing the contents to combine comprises applying centripetal force to the first and second chambers.

30. The method of claim 15, wherein the first chamber retains a buffer, a polymerase, dNTPs, and at least one of a primer and a probe and the second chamber retains an aqueous solution of Mg²⁺ ions.

31. The method of claim 30, wherein at least some of the dNTPs are ddNTPs.

32. The method of claim 15, wherein the at least one second component comprises a catalyst.

33. The method of claim 15, wherein the at least one second component comprises an initiator.

34. The method of claim 15, wherein the at least one second component comprises a promoter.

35. The method of claim 15, wherein the at least one second component comprises a magnesium catalyst.

36. The method of claim 15, wherein the at least one second component comprises an enzyme.

37. The method of claim 15, wherein the at least one second component comprises a cofactor.
38. The method of claim 15, wherein at least one of the first and the second chambers are preheated.
39. The method of claim 15, wherein the at least one second component is a salt of magnesium that has been dried down in the second chamber.
40. The method of claim 15, wherein the at least one second component is a salt of magnesium.
41. The method of claim 15, wherein the at least one second component includes magnesium and glycerol.
42. The method of claim 15, wherein the at least one first component and the at least one second component are combined, the combined components are heated, and the heated combined components are mixed.
43. The method of claim 42, wherein the heated combined components are mixed by thermal mixing.

44. The method of claim 42, wherein the heated combined components are mixed by thermally-activated solutization.

45. The method of claim 42, wherein the heated combined components are mixed by vortexing.

46. The method of claim 42, wherein the heated combined components are mixed by sonication.

47. The method of claim 42, wherein the heated combined components are mixed by shaking.